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Technical Article 1

STAND AND STOCK TABLE PREPARATION USING A PROGRAMMABLE CALCULATOR

Donald L. Rockwood and David K. Riman[1]

ABSTRACT

A program for construction of stand and stock tables for various types of forest inventories has been developed for programmable calculators. Inventories using horizontal point sampling or fixed area plot sampling, any sampling unit size, a combined variable tree yield equation, and English or metric units may be summarized in terms of per unit area and total stand and stock tables.

INTRODUCTION

Programmable calculators are readily accessible to practicing foresters, and make possible the rapid summary of large data sets. A large variety of programs for calculators, such as the Hewlett-Packard models 65 and 67[2] and Texas Instruments model TI-59 is available (e.g. Jager 1976, Foley 1979, Burgan 1980), and programs for the summarization of forest inventories have been written for special cases (e.g. Barrett and Linden 1978, Shepperd 1980). However, a generalized program covering the wide range of forest inventory options is needed. The following is a brief description of such a program for the HP-67.

[1]Associate Professor and Forestry Student, respectively, School of Forest Resources and Conservation, University of Florida, 118 Newins-Ziegler Hall, Gainesville, FL 32611.

[2]The use of trade, firm, or corporation names is for the convenience of the reader and does not indicate endorsement by the authors.

USE OF THE PROGRAM

Inventory Types

Cruising methods which can be summarized are horizontal point sampling (HPS) and fixed area plot sampling (FAP), and any size sampling unit can be employed. By appropriate manipulation of the plot size and stand size specifications under the FAP option, strip cruises, partial tallies, and complete enumerations can also be handled. Forest inventories using either English or metric units may be processed.

Tree Yield Equations

Any combined variable equation for volume or weight of the form

$$\text{Yield} = b_0 + b_1 \cdot \text{DBH}^2 \cdot \text{H}$$

may be entered into the calculations. The yield, DBH, and height variables can have either English or metric units, and the yield and height variables can, of course, be of any specification as long as the tree parameters are input accordingly.

Program Operation

Input requirements and derived output are illustrated by the following example:

Cruising Method:	HPS, Basal Area Factor = 10
Units:	English
Yield Equation:	$ft.^3 = -.976 + .002853 \cdot DBH^2 \cdot H$
Number of Points:	5
Stand Size:	20 acres
Tally:	10 in., 60 ft. - 10 trees
	10 in., 70 ft. - 15 trees
	11 in., 60 ft. - 8 trees
	11 in., 70 ft. - 17 trees

Following entry of the program into the calculator via the program card, the processing steps consist of:

1. Specification of cruising method,
2. Specification of type of units,
3. Entry of yield equation coefficients,
4. Input of sampling unit size,
5. Input of number of sampling units,
6. Input of stand size, and
7. Input of tallies and output of stand and stock data by diameter classes to produce the stand and stock tables below:

	Per Acre		
DBH	Basal Area	Trees	Volume
10	50.0	97.7	1636.8
11	50.0	75.8	1673.2
Total	100.0	167.5	3310.0

	Total Stand	
	Trees	Volume
	1834	32,735
	1515	33,464
Total	3349	66,199

The program is designed to generate overall summary data. However, it can be used similarly for individual sampling unit summaries when location-specific data are needed by setting the number of sampling units and stand size parameters to 1.

Program Content

The program's 188 steps are contained on one magnetic card for the HP-67. The program will also function on the HP-41C, which has alphabetic display capability, and with minor program modification, prompting for the various input and output steps could be included. With appropriate revision of program steps, the program can be adapted to other calculators.

Program Availability

A program listing and user's guide (and program card, if a magnetic card is supplied) will be provided upon request to the senior author.

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Technical Article 2

GETTING MORE OUT OF WORD-PROCESSING

W. Brad Smith and Carol A. Weist[1]

ABSTRACT

Word-processors, linked to a computer via a communication interface, facilitate the preparation of manuscripts containing many tables. The advantages of this setup for providing photo-ready copy for table publication are presented.

Computers have greatly aided the efficient generation and analysis of numeric information for research. Now, we must find ways to merge this numeric information with text to produce publication-quality copy.

Programming languages for large computers used by research-oriented organizations are geared toward processing large sets of data with little concern for how the output may be published. For example, FORTRAN, a computer programming language widely used for efficient processing of large quantities of numeric data, is quite cumbersome when the output for publication is text and tables combined.

Recently, personnnel at the North Central Forest Experiment Station, (USDA Forest Service), St. Paul, Minnesota, have linked a large-scale computer[2] with a word-processor[3] to dramatically improve manuscript preparation.

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[1]Respectively Research Forester and Computer Programmer, USDA Forest Service, North Central Forest Experiment Station, 1992 Folwell Ave., St. Paul, MN 55108.

[2]CDC Cyber 74/172, University Computer Center, University of Minnesota, Minneapolis, Minnesota.

[3]CPT 8000 word-processor with communications interface, system software and printer, CPT Corporation, Minneapolis, Minnesota.

A word-processor is an automated typing and filing sytem. The basic components are generally a CRT (television screen), typewriter keyboard, electronic micro-processor (the brains), local mass storage medium (cassette, disk, diskette, etc.), printer, and related software (math packages, sorting routines, edit rountines, etc.). The physical arrangement of these components may vary depending upon the manufacturer and user needs.

The basic attraction of word-processor systems is their flexibility in manipulating the information recorded on the local mass storage medium. Once recorded, information may be quickly and easily reformatted, edited and output. The addition of various software enhancements to the basic system make the word-processor even more indispensable as a manuscript preparation tool. Math software, for instance, allows the word-processor to be used as a programmable calculator. This feature addes a new dimension to table preparation by performing math operations on individual entries or entire rows or columns of entries. The basic math operations (add, subtract, multiply, and divide) are generally available along with special functions such as square root and rounding.

In general, word-processors with software enhancements perform well as stand-alone microprocessors. However, with the addition of a communications interface to a large computer, the potential of the word-processor mushrooms. The interface is a physical link between word-processor and computer via telephone or other data transmission lines. The effect of the interface is synergistic, the combined capabilities and efficiencies far outdistancing that of either individual system. The word-processor is no match for a large-scale computer for grinding out vast quantities of numeric information, but the computer is no match for the ease and efficiency with which clerical personnel can format, edit, statistically check tabular information, and then mesh that information with previously recorded text to produce publication-quality manuscripts.

The preparation of forest inventory tables by the Station's Renewable Resources Evaluation Unit is an example of how the word-processor can interface with the computer. These tables summarize forest areas and related volume information from state-wide inventories. In Minnesota over 400 tables averaging 200 entries each were prepared for publication.

These tables were assembled from current and previous inventories, and other reports. The data from the current inventory were tabulated and stored by the computer while information from previous inventories and other reports were on computer tapes or word-processor diskettes. The word-processor was used to assemble the tables and text. Then each table was checked with the word-processor calculator for statistical accuracy. Other checks may include comparing the totals in different tables and computing indicators such as data trends.

Example 1 shows a table that has been assembled and verified using this process. The table

EXAMPLE 1

Table 21.--Area of noncommercial forest land by forest type, Minnesota, 1977

(In thousand acres)

Forest type	All areas	Productive-reserved areas[1]	Unproductive areas	
Jack pine	211.0	208.2	2.8	.0
Red-white pine	79.4	71.9	7.5	.0
Spruce-fir	171.9	104.7	67.2	.0
Black spruce	1,101.1	68.7	1,032.4	.0
Northern white-cedar	148.6	12.6	136.0	.0
Tamarack	177.0	3.2	173.8	.0
Oak-hickory	111.6	11.3	100.2	.1
Elm-ash-cottonwood	225.9	38.3	187.6	.0
Maple-basswood	30.7	23.1	7.6	.0
Aspen-birch	743.0	633.9	109.1	.0
Nonstocked	13.9	2.6	11.3	.0
All types	3,014.1	1,178.6	1,835.5	.0
	.0	.1	.0	

[1]Includes 3,000 acres of productive-deferred forest land, commercial forest land being withheld from harvest while a decision is made whether to place it in productive-reserved status.

title and the column and row stubs in the example were stored on a word-processor diskette. These stubs and titles may be used with minor modifications in other reports. The numbers in the body of the table were transferred directly from the computer to the word-processor via the communications interface. (The numbers shown in the boxes below the row totals and beside the column totals do not appear at this point.) Since the transfer of numbers to the table body requires no clerical transcription, the time-consuming proofreading at this step is eliminated. The numbers in the boxes indicate the results of a user-programmed routine to check row and column totals using the word-processor calculator. In the example, the ".1's" indicate a rounding error in the second column, seventh row. By changing the entry from 11.3 to 11.4 the table will add correctly across and down. Once the tables are in their final form, the word-processor printer is used to produce high-quality, camera-ready copy in one of many user selectable type faces.

In conclusion, we believe that a word-processor used in tandem with a large computer adds tremendous flexibility to the manuscript preparation process. Human error is virtually eliminated in transcribing tabular information. Publication-quality copy is quickly produced and verified by clerical personnel without extensive training, while programming staff support is significantly reduced. Less time is spent typing, adding, and proofreading tables. Quality control is greatly improved; style and format are more consistent. Although the cost of such a system (about $620 per month in our case) may seem staggering, we are convinced that the benefits derived from drastically reduced manuscript preparation time far outweigh the cost.

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CALL FOR PAPERS

"Microcomputers--A New Tool for Foresters" is the theme of a conference to be held at Purdue University on May 18-20, 1982. The conference is being sponsored by Purdue's Department of Forestry and Natural Resources and co-sponsored by the Inventory and the Systems Analysis Working Groups of the Society of American Foresters.

The conference objectives are to advance professional foresters' knowledge of the rapidly expanding microcomputer field, and to introduce potential and presently developed forestry applications for microcomputers.

Persons wishing to present papers should submit a 200-word abstract, title for paper, names of authors, and contact person by October 1, 1981 to: John W. Moser, Jr., Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana 47907; Phone: 317/494-3596.

* * * * *

CURRENT LITERATURE

Please order directly from sources given in ( ). For journal articles, contact your local library for availability.

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MEETING, WORKSHOPS, AND SYMPOSIA

October 5-8, 1981. Symposium and Workshop on Dutch Elm Disease. (Manitoba, Canada). Contact: E. S. Kondo, Great Lakes Forest Research Centre, Canadian Forestry Service, P. O. Box 490, Sault Ste. Marie, Ontario, Canada P6A 5M7. Telephone (705) 949-9461.

October 5-9, 1981. Short Course on The Application and Processing of Lansat Data. No registration fee is required. Continuing Education Units (CEU) are available if requested. Co-sponsored by Murray State University and the NASA Earth Resources Laboratory. Contact: Dr. Neil V. Weber, Director, Mid-America Remote Sensing Center, Murray State University, Murray, KY 42071; telephone (502) 762-2148.

October 13-24, 1981. International Geologic Correlation Programme (IGCP) Workshop on Remote Sensing and Mineral Exploration. (Nairobi, Kenya). Contact; W. D. Carter, U.S. Geological Survey, National Center, Mail Stop 730. Reston, VA 22092.

October 18-21, 1981. Remote Sensing: An Input to Geographic Information Systems in the 1980s. Pecora VII Symposium. (Sioux Falls, SD). Contact: Dr. B. F. Richardson, Dept. of Geography, Carroll College, Waukesha, WI 53186. Phone (414) 547-1211, Ext. 144.

October 26-30, 1981. Applications of Remote Sensing in Geology/Hydrology. Contact: Branch of Applications, EROS Data Center, Sioux Falls, SD 57198. Phone (605) 594-6114.

October 28-30, 1981. A symposium on the acquisition and utilization of aquatic habitat inventory information. Organized by the Western Division, American Fisheries Society. Contact: Neil B. Armantrout, P. O. Box 2965, Portland, OR 97208. Phone (503) 231-6870; FTS 429-6870.

November 16-20, 1981. Advanced Geological Workshop. Contact: Branch of Applications, EROS Data Center, Sioux Falls, SD 57198. Phone (605) 594-6114.

November 30-December 11, 1981. International Statistical Institute, 43rd Biennial Session, (includes meetings of Bernoulli Society for Mathematical Statistics and Probability, International Association for Statistical Computing and International Association of Survey (Statisticians), Buenos Aires, Argentina. Contact: ISI Permanent Office, 428 Prinses Beatrixlaan, 2270 AZ Voorburg, Netherlands.

February 15-18, 1982. The Third Symposium on Environmental Concerns in Rights-of-Way Management. Call for papers. (San Diego, California). Contact: Allen F. Crabtree, Environmental Enforcement Division, Michigan Department of Natural Resources, Mason Building, 6th Floor, Lansing, MI 48909. Phone (517) 373-3503.

May 18-20, 1982. Microcomputers--A New Tool For Foresters. Contact: John W. Moser, Jr., Dept. of Forestry and Natural Resources, Purdue University, W. Lafayette, IN 47907. Phone (317) 494-3596.

August 8-12, 1983. Resource Inventories for Monitoring Change and Trends. Contact: John F. Bell, School of Forestry, Oregon State University, Corvallis, OR 97330. Phone (503) 754-4036; FTS 425-4036.

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WANTED--Materials for the Newsletter--Technical articles, news items, current literature, and meeting notices. All articles received are to be grammatically and technically correct. Send your material to Resources Evaluation Newsletter, Rocky Mountain Forest and Range Exp. Stn., 240 West Prospect Street, Fort Collins, CO 80526. Phone: (303) 221-4390, ext. 202 or FTS 323-1201.

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Some views expressed in this Newsletter may not necessarily reflect the position of all of the sponsoring agencies.

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